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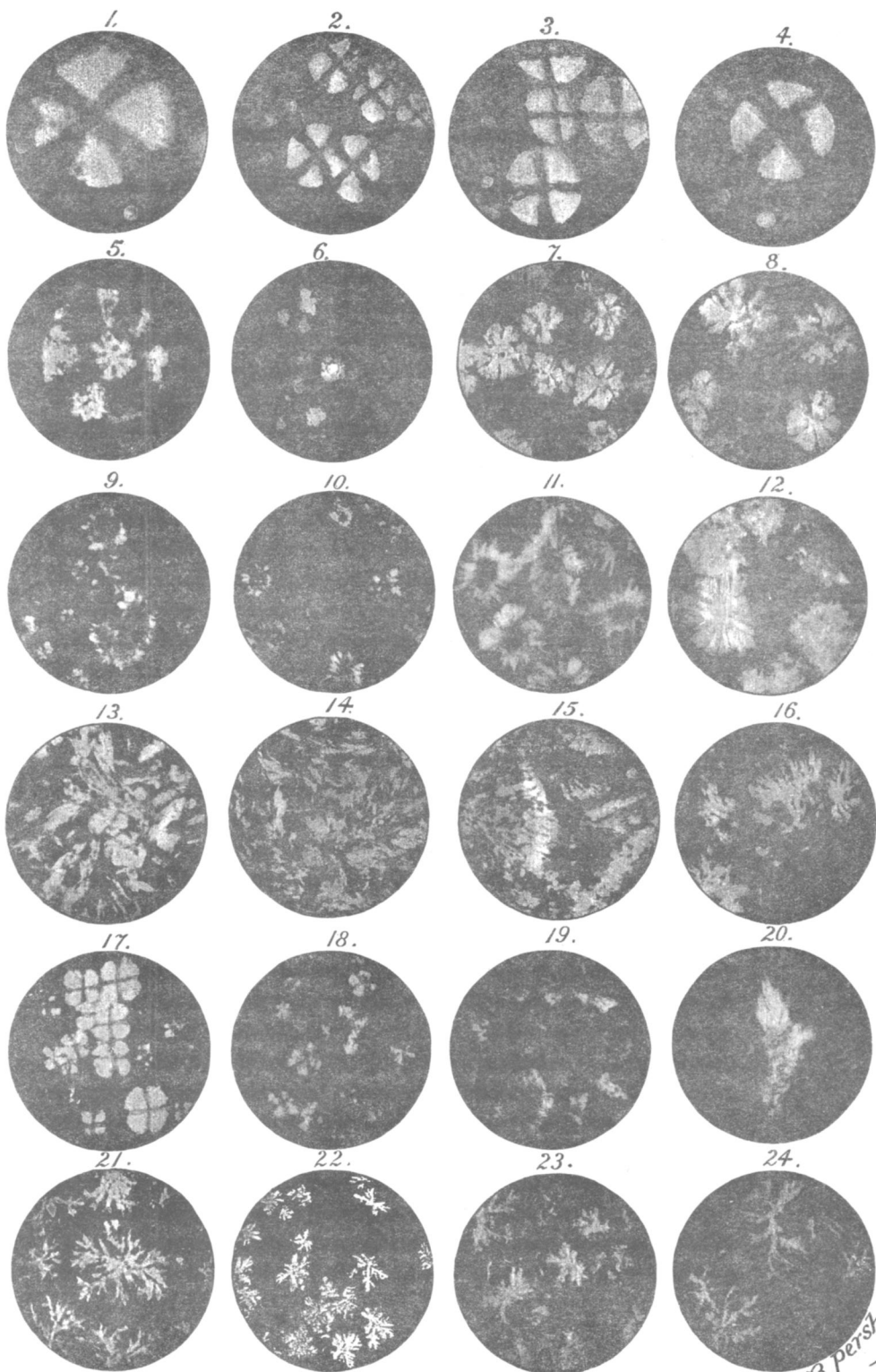
REPLY TO PROFESSOR WEBER.

THOMAS TAYLOR, M. D., Washington, D. C.

Prof. Weber has divided his review of my work relating to the examination of butter and fats into three parts: First, the detection of foreign bodies other than fats; second, the examination of the commercial fat by polarized light without further treatment; and third, the examination of the crystalline nature of butter and other fats, after submitting them to heat according to what he designates as my method.

With regard to the first,—the detection of foreign bodies other than fats,—Prof. Weber says that in his opinion it is the only part of the method which gives promise of true value but is the one upon which I have laid least stress, and have considered of least value. Prof. Weber is not justified in this statement of my views by anything which I have said or written. The fact is that I made conspicuous mention of my discovery of animal tissues and microscopic blood-vessels in oleomargarine, in *Hitchcock & Wall's American Quarterly Microscopical Journal*, July, 1879, illustrating the same with lithographic drawings, and prior to that date in the columns of the *Scientific American*, and have made no subsequent statements tending to impair the value of these observations.

As regards the second point, *viz.*, the examination of the commercial fat by polarized light without further treatment, Prof. Weber presents no evidence of having made a single observation of commercial fats or of butterine in the unboiled condition. In but two of his experiments did he follow my method, *viz.*, those with lard and butter, for, in his third experiment he states that he used "oleo oil" instead of "beef kidney fat" as mentioned in my "abstract." He next experiments with three different compounds of butter and "oleo"; the first consisting of ninety parts butter and ten parts "oleo," the second, seventy-five parts butter and twenty-five parts "oleo," and the third, fifty parts butter and fifty parts "oleo."



EXPLANATION OF PLATE VII.

CRYSTALLINE FORMATIONS OF BUTTER AND FATS.

- FIGS. 1, 2, 3 and 4. —Represent primary butter crystals. $\times 80-110$.
FIGS. 5 and 6. —Secondary butter crystals forming within primary.
FIGS. 7 and 8. —Secondary crystals which have separated from the primary forms. $\times 80-110$.
FIGS. 9, 10 and 11. —Tertiary butter crystals, formed by the breaking up of secondary. $\times 80-140$.
FIG. 12. —Tertiary passing into the amorphous. $80-140$.
FIGS. 13, 14, 15 and 16. —Represents oleomargarine. $\times 80-110$.
FIG. 17. —Oleo. $\times 140$. This form of crystal, found in boiled oleomargarine.
FIG. 18. —Neutral lard. (Boiled and cooled at 60° F.)
FIGS. 19 and 20. —Common lard. $\times 140-400$. Boiled and cooled at 60° F.
FIGS. 21, 22, 23 and 24. —Crystals of beef fat from various tissues of the ox. (Omentum, kidney, marrow of the femur, and of the round, rendered and cooled.)

NOTE.—These figures, made to illustrate Dr. Taylor's "reply," are from photographs prepared by Bernard Persh.

Each of these he boiled, cooled and examined, and as a result found that all exhibited butter crystals. However interesting these experiments may have been, they do not represent my method of testing for oleomargarine. I have stated that it is necessary to examine all butter substitutes as purchased, since, by so doing, fats foreign to butter can be at once detected by the microscope, whereas, by boiling as a first step, especially in the case of a butter substitute which contains a large proportion of butter, the crystals of lard and beef fat may escape detection by being absorbed in the larger crystals of butter developed in the cooling process.

It is well known that the lard and beef fats are subjected to a high temperature in the process of rendering preparatory to their employment in the manufacture of butterine. The butter added is melted at its lowest melting point. The lard and beef fat "oleo" and butter are then churned together and cooled. Now, in consideration of the fact that the butter is never boiled in the manufacture of butterine, butter crystals will not be found in it, as sold. The lard and beef fat having been rendered at a high temperature readily re-crystallize at ordinary temperatures, notwithstanding their having been chilled during the process of manufacture. Prof. Weber says that by boiling "oleo" with salt and water he can produce crystals of fat resembling those of boiled butter, showing a cross, and that they cannot be distinguished from those of butter. His object in the production of the "oleo" crystal is to prove, if possible, that since "oleo" is used in the manufacture of oleomargarine, the latter, if boiled, could not be distinguished from pure butter, because the "oleo" crystal with cross would appear even where butter was absent. The "oleo" crystal when viewed with a low power is very easily distinguished from the butter crystal on account of its highly spinous character and other peculiarities, and also it does not in any case appear unless the *oleomargarine is boiled*. Had Prof. Weber read my official report he would have found that my first step is to examine the suspected butter substitute under the microscope *as purchased*, when if the substance be an oleomargarine, the crystals of foreign fats will be at once discovered. The presence of the foreign fats being thus proved what useful purpose can be served by boiling the specimen? In all the cases in which I

have been consulted by the authorities in Washington, D. C., I have never recommended a prosecution unless I have found an abundance of lard or beef fat crystals in the suspected material, and it is a significant fact that all the parties convicted acknowledged publicly in open court that the substance sold by them for butter was oleomargarine.

Prof. Weber is in error in supposing that a mixture of salt and water with butter is necessary for the production of globose crystals showing a cross. Any unsalted, well made, fresh butter if boiled and cooled properly will yield the butter crystal with cross, as experiment will demonstrate. Prof. Weber says that the "oleo crystal" with cross could not be distinguished from the butter crystal. What proof, then, had he that the butter-like crystal he saw in the boiled butterine made by himself was not that of pure butter? Especially when we consider that the butterine he made for these experiments contained a much larger percentage of butter than is found in any butterine sold in market. I have not yet found in the Washington market any butter substitute rich enough in butter to show a butter crystal when boiled. In an experiment made in the laboratory of the Department of Agriculture, at my request, by one of the assistant chemists, a butterine was made containing *ninety-nine per cent. butter and one per cent. lard*. This compound was thoroughly mixed in the heated laboratory until it became semi-fluid. On viewing a portion of this under the microscope with polarized light and selenite plate, eleven crystals of lard, of a rich yellow color were observed on a green field, the green field representing the butter. To make the experiment conclusive the butter and lard were examined separately. The former gave an even green field while the latter exhibited the stellar crystals seen in the mixture. This experiment was witnessed by Prof. Wiley, chief chemist, and two assistants. Prof. Weber states that when he melted a fat and cooled it quickly he found that no crystals had formed. In this experiment he but verified a statement which appeared in a foot-note to my paper on the detection of oleomargarine published in 1879, *American Quarterly Microscopical Journal*, to wit, that butter substitutes composed of solid fats, when newly made and suddenly chilled, did not show any crystals of fat when examined in

the fresh condition, but "it is not unlikely that these will gradually form in course of time." "Experience shows that the fats other than butter readily crystallize when subjected to a rise of temperature."

I strongly object to Prof. Weber's constant use of the term "characteristic butter crystal" within quotation marks. Nowhere have I stated that the cross is characteristic of the butter crystal, meaning thereby that the cross is not observed on other polarizing bodies. I have considered the cross of butter as a factor only, contending that it is never absent from the globose butter crystal. I have also shown that the "butter crystal" has some peculiarities not yet found in connection with other crystals of fats.